For the lines connected with the figure, we have the following symbols:-

$$B_1C_1 = [1, 0, 0\ ],\quad C_1A_1 = [0, 1, 0\ ],\quad A_1B_1 = [0, 0, 1\ ];$$
$$O\ A_1 = [0, 1, -1],\quad O\ B_1 = [-1, 0, 1],\quad O\ C_1 = [1, -1, 0];$$
$$B_2C_2 = [-3, 1, 1],\quad C_2A_2 = [1, -3, 1],\quad A_2B_2 = [1, 1, -3];$$
$$a\ b\ c\ = [1, 1, 1\ ];$$

and any three are concurrent when the determinant of their coordinates vanishes. A point, P, is on a line, L, if $lx+my+nz$ vanishes identically.

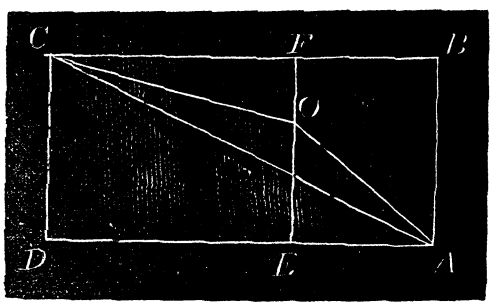
This notation is especially adapted to reciprocations. In order to pass from a point to a line, it is only necessary to exchange the symbols ( ) and [ ].

[Professors Scheffer, Johnson and A. T. Smith, each answered the Query published at p. 176, Vol. IV, but want of room compels us to defer the publication of the answer to No. 2.]

PROBLEMS.

187. By Isaac H. Turrell, Cincinnati, Ohio.—Six circles may be described each of which shall touch four of the others. Prove that the lines joining the centers of the non-touching pairs, are concurrent.

188. By Henry C. Allen, New York City.—Two given rectangular planes, $ABFE$ and $EFCD$ lie contiguous, as in the figure. The plane BE is hard ground whereon one can travel at the rate $2m$; the other is soft ground whereon the rate of travel is m. Required the point O of crossing EF so that the time of journey from A to C shall be the qnickest possible.



189. By Prof. J. H. Kershner, Mercersburg, Pa.—Find by Algebra the series whose sum is 127, when the sum of the squares of the seven terms is 5461.

190. By Prof. Orson Pratt, Sen.—Transform the equation,

$$x^9+9x^8+36x^7+85x^6+132x^5+141x^4+105x^3+54x^2+18x+9 = 0,$$

into an equation of the third degree.

191. By W. E. Heal. — Compute, in the most convenient way, the product of the differences of the equation $x^5 - ax^4 + bx^3 - cx^2 + dx - e = 0$.

192 By Geo. M. Day, Lockport, N. Y. — Find the average area of all the circles inscribed in a given semicircle.

193. By E. B. Seitz, Greenvill, Ohio. — A triangle is formed by joining three points taken at random in the surface of a given triangle. Find the chance that the circle circumscribing this triangle lies wholly within the given triangle.

194. By Prof. D. J. Mc. Adam, Washington, Pa.—Sum the series

$$1 - \frac{1}{2^2} + \frac{1}{4^2.2^2} - \frac{1}{6^2.4^2.2^2} + \frac{1}{8^2.6^2.4^2.2^2} - \&c.$$

195. By Prof. J. Scheffer, College of St. James, Md. —A uniform rod rests with one extremity against a rough vertical wall, and with the other extremity on a rough horizontal plane, such that it is held in equilibrium by friction alone. The beam is *not* in a a vertical plane. The coefficient of friction of the horizontal plane and vertical wall being respectively μ and μ'; find the normal pressure of the rod upon the horizontal plane and vertical wall, and the exact position of the rod with reference to the two latter planes.

PUBLICATIONS RECEIVED.

A List of Writings Relating to the Method of Least Squares, with Historical and Critical Notes. By Mansfield Merriman, Ph. D., Instructor in the Sheffield Scientific School of Yale College. 82 pp. 8vo. New Haven, Conn. 1877.

Science Observer. 8 pp. 8vo. Monthly. 50cts. per annum. Boston, Mass.

ERRATA.

On page 154, Vol. IV, line 12, for $\frac{2}{3}$, before ( ), read $\frac{1}{3}$.
" " 190, " " " 3, for y^3 read x^3.
" " 191, " " " 10, frnm bottom, for $2ac$, read $2ae$.
" " 13, (current volume) line 4, from bottom, for q, o, qq^{oo}, read q, q_o, q^{oo}.